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NEW SILVER NANOCOMPOSITES BASED ON COPOLYMERS OF AZANORBORNENES WITH N-VINYLPYRROLIDONE

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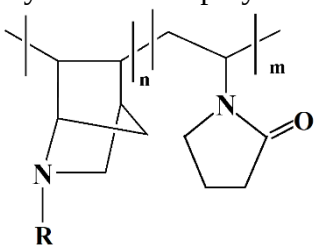
Abstract. The copolymers of N-methyl-2-azanorbornene-5 (MAN), N-benzyl-2-azanorbornene-5 (BAN), N-allyl-2-azanorbornene-5 (AAN) and N-(2-azanorbornene-5)methylacetate (MAAN) with N-vinylpyrrolidone (VP) have been obtained by free radical polymerization.



R = CH_3 (MAN), CH_2-C_6H_5 (BAN),
CH_2-CH=CH_2 (AAN),
CH_2-C(O)OCH_3 (MAAN)

New silver nanocomposites based on new copolymers have been obtained by the reduction of $AgNO_3$ with $NaBH_4$ in copolymer solution. Reaction proceeds via formation of the stable dark brown sols, from which silver nanocomposites were separated.

The content of silver in the composites was found to be in the range from 4 to 15 wt%. The ratio of silver nitrate, reducing agent and copolymer significantly affects the silver concentration in nanocomposites.

UV- spectroscopy and scanning electron microscopy techniques were used to characterize the formation of silver nanoparticles in copolymers. The average silver particle size ranged from 22 to 32 nm, with the corresponding UV-vis absorption peak position at 400-415 nm (Figure 1).

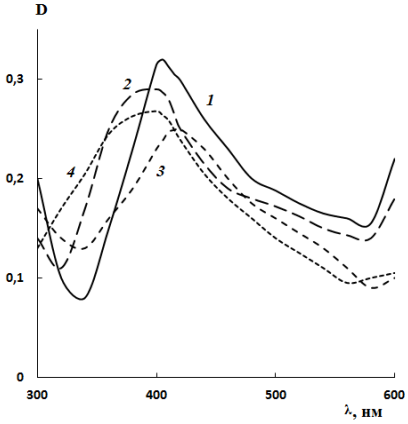


Figure 1. UV extinction spectra of nanocomposite water solution: *1* - MAN, C=$2\cdot10^{-3}$ mol/l; *2* – BAN, C=10^{-3} mol/l; *3* - AAN, C=$0.5\cdot10^{-3}$ mol/l; *4* - MAAN, C=$2\cdot10^{-3}$ mol/l.

SEM results prove the obtaining of nanocomposites with regular narrow-dispersed distribution of silver nanoparticles in polymer matrice. Nanoparticles of spheric and elliptic forms were obtained.

Investigation showed that new nanocomposites have exhibited significant cytotoxic activity towards rhabdomyosarcoma line cells and can be used for medical applications.

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